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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/851,938	05/10/2001	Marufa Kaniz	F0678	4054

45114 7590 03/17/2005

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EXAMINER	
PHAN, MAN U	

ART UNIT	PAPER NUMBER
2665	

DATE MAILED: 03/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/851,938	KANIZ ET AL.	
	Examiner	Art Unit	
	Man Phan	2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 May 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-8,10-17,19 and 20* is/are rejected.

7)☒ Claim(s) *2,9 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The application of Kaniz et al. for a "Parallel lookup tables for locating information in a packet switched network" filed 05/10/2001 has been examined. Claims 1-20 are pending in the application.

Specification

2. **Cross References to related applications need to be updated.**

The disclosure is objected to because of the following informalities: Under cross reference to related applications, status needs to be updated. Serial number 09/851,934 filed on May 10, 2001.

Claim Rejections - 35 USC ' 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent

any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 1038 and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alexander (US#6,553,029) in view of Michels et al. (US#6,453,358).

With respect to claims 1 and 3-7, Alexander (US#6,553,029) and Michels et al. (US#6,453,358) disclose a novel system and method for routing and forwarding of information in packet switching network, according to the essential features of the claims. Alexander (US#6,553,029) discloses in Fig. 1 a block diagrams illustrated the novel multiport switch architecture, in which data packets containing source and destination addresses are received on one or more incoming ports for distribution on one or more outgoing ports. An address look-up table stores previously processed source and destination addresses, together with source and destination contexts associated with the respective source and destination addresses. The contexts represent either a specific physical port, or an aggregated grouping of ports. A distribution table stores, for each aggregated grouping of outgoing ports, a corresponding aggregated group of identifiers of specific outgoing ports. As each packet is received, its source and destination addresses are extracted and the address look-up table is searched for those source and destination addresses. If the address look-up table contains those source and destination addresses then the source and destination contexts associated with those source and destination addresses are retrieved from the address look-up table. If the

address look-up table does not contain a source address corresponding to the extracted source address, then a source context corresponding to the extracted source address is derived and stored in the address look-up table with the extracted source address. If the retrieved destination address context represents a specific outgoing port, then the received packet is queued for outgoing transmission on that port. If the retrieved destination address context represents an aggregated grouping of outgoing ports, then the identifiers for the outgoing ports comprising that grouping are retrieved from the distribution table, and the received packet is queued for outgoing transmission on all of the outgoing ports comprising that grouping (Col. 2; lines 21 plus and Col. 8, lines 1 plus).

Alexander (US#6,553,029) differs from claims in that Alexander does not expressly disclose the plurality of addrerss lookup tables. However, Alexander teaches the forwarding function which is executed by embedded CPU 14 to accept the context information retrieved by address resolution unit 10 for the source and destination MAC addresses, and to convert this information into the actual forwarding command supplied to queuing unit 18 along with the packet to cause it to be transmitted out the desired port(s). The forwarding function utilizes distribution table 22 to aid in selecting among multiple ports that have been bound into a logical aggregate. The data structure of distribution table 22 is organized as a set of look-up tables that map between hash keys (stored with the source and destination MAC addresses by the learning function) and specific physical ports that are members of aggregate groups. One look-up table is associated with each aggregate group; there are thus as many look-up tables as there are aggregate groups. The size of each look-up table is determined by 2 raised to the power of the number of bits in the hash key. For instance, if there are two sets

of aggregate groups supported by the system, and the hash keys are 3 bits in size, then the distribution table data structure will consist of two look-up tables, each containing 2.sup.3 =8 entries. Each look-up table is bound to the logical identifier assigned to the given aggregate group. The look-up tables must be updated as physical ports are added to or removed from aggregate groups (Col. 5, lines 55 plus). In the same field of endeavor, Michels et al. (US#6,453,358) discloses a switching device (e.g., router, switch, switching router, telephone switch, etc.) that forwards network traffic to a desired destination on a network, such as a telephone or computer network. Mitchels teaches in Fig. 3 a switching device 50 with two internal binary search engines 66, 68 coupled in series. Binary search engines 66 and 68 are coupled to respective memories 58 and 70. The memories together store a lookup table that the binary search engines use for analyzing network frames received from media interface 56. (See also Fig. 6, Col. 4, lines 40 plus and Col. 13, lines 14 plus).

One skilled in the art would have recognized the need for effectively and efficiently routing and forwarding of information in packet switching network, and would have applied Michels' teaching in the process of forwarding network traffic information utilizing multiple address look up tables associated with search engines into Alexander's novel use of the distribution of data packets in Ethernet frame switches. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to apply Michels' network switching device with concurrent key lookups into Alexander's link aggregation in Ethernet frame switches with the motivation being to provide a method and apparatus for routing and forwarding of information in packet switching network.

5. Claims 8, 10-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alexander (US#6,553,029) in view of Kalapathy et al. (US#6,810,037).

With respect to claims 16-17 and 19-20, Alexander (US#6,553,029) discloses in Fig. 1 a block diagrams illustrated the novel multiport switch architecture, in which data packets containing source and destination addresses are received on one or more incoming ports for distribution on one or more outgoing ports. An address look-up table stores previously processed source and destination addresses, together with source and destination contexts associated with the respective source and destination addresses. The contexts represent either a specific physical port, or an aggregated grouping of ports. A distribution table stores, for each aggregated grouping of outgoing ports, a corresponding aggregated group of identifiers of specific outgoing ports. As each packet is received, its source and destination addresses are extracted and the address look-up table is searched for those source and destination addresses. If the address look-up table contains those source and destination addresses then the source and destination contexts associated with those source and destination addresses are retrieved from the address look-up table. If the address look-up table does not contain a source address corresponding to the extracted source address, then a source context corresponding to the extracted source address is derived and stored in the address look-up table with the extracted source address. If the retrieved destination address context represents a specific outgoing port, then the received packet is queued for outgoing transmission on that port. If the retrieved destination address context represents an aggregated grouping of outgoing ports, then the identifiers for the outgoing ports comprising that grouping are retrieved from the distribution

table, and the received packet is queued for outgoing transmission on all of the outgoing ports comprising that grouping (Col. 2; lines 21 plus and Col. 8, lines 1 plus).

However, Alexander does not expressly disclose a plurality of address sub-tables including a plurality of addressable table entries for storing frame forwarding information. In the same field of endeavor, Kalapathy et al. (US#6,810,037) disclose a method for searching a table in a network switch includes the steps of dividing a primary lookup table into a first sub table and a second sub-table, searching the first sub-table with a first search engine, and simultaneously searching the second sub-table with a second search engine. A method for searching a primary address table within a network switch uses the steps of dividing the primary address table into a first and second address sub-tables, storing even numbered memory address locations from the primary address table within the first address sub-table in sorted order, and storing odd numbered memory address locations from the primary address table within the second address sub-table in sorted order. Thereafter the method includes the steps of searching the first address sub-table with a first search engine, and simultaneously searching the second address sub-table with a second search engine (See Fig. 1; Col. M1, lines 36 plus). Kalapathy further teach in Fig. 13 a block diagram illustrated an egress manager 76 of Fig. 10, in which the packet information will include an indication of whether or not the packet is stored in CBP 50 or GBP 70, the size of the packet, and the PID. RCIF 131 then passes the received packet information to transaction FIFO 132. Transaction FIFO 132 is a fixed depth FIFO with eight COS priority queues, and is arranged as a matrix with a number of rows and columns. Each column of transaction FIFO 132 represents a class of service (COS), and the total number of rows equals the number of transactions allowed for

any one class of service. COS manager 133 works in conjunction with scheduler 134 in order to provide policy based quality of service (QOS), based upon Ethernet standards. As data packets arrive in one or more of the COS priority queues of transaction FIFO 132, scheduler 134 directs a selected packet pointer from one of the priority queues to the packet FIFO 139. The selection of the packet pointer is based upon a queue scheduling algorithm, which is programmed by a user through CPU 52, within COS manager 133 (Col. 57, lines 25 plus).

Regarding claims 8, 10-15, they are method claims corresponding to the apparatus claims above. Therefore, claims 8,10-15 are analyzed and rejected as previously discussed with respect to claims 16, 17, 19-20.

One skilled in the art would have recognized the need for effectively and efficiently routing and forwarding of information in packet switching network, and would have applied Kalapathy' novel use of the address sub-tables with search engines for locating information into Alexander's teaching of the distribution of data packets in Ethernet frame switches. Therefore, It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to apply Kalapathy' apparatus and method for sorted table binary search acceleration into Alexander's link aggregation in Ethernet frame switches with the motivation being to provide a method and apparatus for routing and forwarding of information in packet switching network.

Allowable Subject Matter

6. Claims 2, 9 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for the indication of allowable subject matter: The closest prior art of record fails to disclose or suggest wherein writing the entry to the one of the first sub-table and the second sub-table based on the network address further includes writing the entry to the one of the first and second sub-tables based on the least significant bit of one of a source field and a destination field of the network address, as specifically recited in the claims.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The merchant et al. (US#6,480,490) is cited to show the interleaved access to address table in network switching system.

The Chiang et al. (US#6,813,266) is cited to show the pipelined access to address table in a network switch.

The Chow (US#6,804,234) is cited to show the external CPU assist when performing a network address lookup.

The Kadambi et al. (US#6,335,935) is cited to show the network switching architecture with fast filtering processor.

The Liu (US#2002/0138648) is cited to show the hash compensation architecture and method for network address lookup.

The Michels et al. (US#6,161,144) is cited to show the network switching device with concurrent key lookups.

The Ganesh et al. (US#6,553,000) is cited to show the method and apparatus for forwarding network traffic.

The Jennings et al. (US#6,580,712) is cited to show the system for controlling look-ups in a data table in a network switch.

The Opalka et al. (US#6,259,699) is cited to show the system architecture for and method of processing packets and/or cells in a common switch.

The Gupta (US#6,278,714) is cited to show the efficient hardware implementation of virtual circuit bunching.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Phan whose telephone number is (571) 272-3149.

The examiner can normally be reached on Mon - Fri from 6:00 to 3:00 EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu, can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2600.

9. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

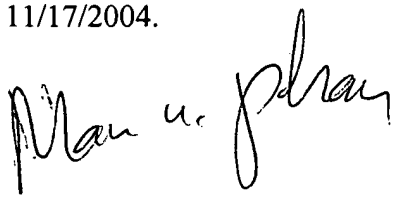
or faxed to: (703) 305-9051, (for formal communications intended for entry)

Or: (703) 305-3988 (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Mphan

11/17/2004.



MAN U. PHAN
PRIMARY EXAMINER